SIEMENS

RUGGEDCOM RS900GP

Installation Guide

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Preface

This guide describes the RUGGEDCOM RS900GP. It describes the major features of the device, installation, commissioning and important technical specifications.

It is intended for use by network technical support personnel who are responsible for the installation, commissioning and maintenance of the device. It is also recommended for use by network and system planners, system programmers, and line technicians.

Alerts

The following types of alerts are used when necessary to highlight important information.

DANGER!
DANGER alerts describe imminently hazardous situations that, if not avoided, will result in death or serious injury.

WARNING!
WARNING alerts describe hazardous situations that, if not avoided, may result in serious injury and/or equipment damage.

CAUTION!
CAUTION alerts describe hazardous situations that, if not avoided, may result in equipment damage.

IMPORTANT!
IMPORTANT alerts provide important information that should be known before performing a procedure or step, or using a feature.

NOTE
NOTE alerts provide additional information, such as facts, tips and details.

Related Documents

Other documents that may be of interest include:

- *ROS User Guide for the RS900GP*

Accessing Documentation

The latest Hardware Installation Guides and Software User Guides for most RUGGEDCOM products are available online at www.siemens.com/ruggedcom.

For any questions about the documentation or for assistance finding a specific document, contact a Siemens sales representative.

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1 Introduction

The RUGGEDCOM RS900GP is an industrially hardened, fully managed Ethernet switch providing dual fiber optical Gigabit Ethernet ports and eight Fast Ethernet copper ports, each capable of supplying high power 802.3at compliant Power over Ethernet (PoE). Designed to operate reliably in harsh industrial environments, the RS900GP provides a high level of immunity to electromagnetic interference and heavy electrical surges typical of environments found in electric utility substations, factory floors or in curb side traffic control cabinets. An operating temperature range of -40 to 85 °C (-40 to 185 °F) coupled with hazardous location certification, a powder coated aluminum enclosure and optional conformal coating allows the RS900GP to be placed in almost any location.

The embedded RUGGEDCOM Rugged Operating System (ROS) provides advanced networking features such as Enhanced Rapid Spanning Tree (eRSTP), Port Rate Limiting and a full array of intelligent functionality for high network availability and manageability.

Section 1.1
Feature Highlights

Ethernet Ports

- Up to 2 - Gigabit-Ethernet Ports (100/1000Base-X)
- 8 - Fast Ethernet Ports (10/100BaseTX) all external 802.3af/802.3at compliant PoE
- Up to 2 - 10/100/1000 BaseTX copper ports
- Full compliance with IEEE: 802.3, 802.3u and 802.3z
- Non-blocking, store and forward switching
- Full duplex operation and flow control (IEEE 802.3x)
- Industry standard fiber optical connectors: LC, SC, SFP
- Bi-Directional simplex fiber support
- Long haul optics allow Gigabit distances up to 70km

Power Over Ethernet (PoE)

- 8-10/100 BaseTx 802.3af/802.3at compliant ports
- Data and power over a single Ethernet cable
- Auto-sensing ports that provide power only to PoE end devices
- Port level over current and short circuit protection

Rated for Reliability in Harsh Environments[1]

- Meets IEEE 1613 (electric utility substations)
- Exceeds IEC 61850-3 (electric utility substations)
- Exceeds IEEE 61800-3 (variable speed drive systems)
- Exceeds IEC 61000-6-2 (generic industrial environment)

[1] When using a suitable external power supply.

- Exceeds NEMA TS-2 (traffic control equipment)
- -40 to 85°C (-40 to 185 °F) operating temperature (no fans)
- Conformal coated circuit boards (optional)
- Rugged powder coated aluminum enclosure

Power Supply

- 2 (redundant) 54VDC inputs (51-57VDC)
- Supports 8 30W PoE powered devices (minimum 260W total output)
- Supports power supply sharing
- Reverse polarity protection
- CSA/UL 60950-1 safety approved to 85 °C (185 °F)

Simple Plug and Play Operation

- Plug and play operation 802.3af/802.3at
- Automatic learning of up to 8192 MAC addresses
- Auto-negotiation on all 10/100BaseTX ports
- Auto-MDI/MDIX (crossover) on all 10/100BaseTX ports
- LED indicators for Link/Activity and Power

ROS® Advanced Network Management

- Enhanced Rapid Spanning Tree (eRSTPTM)
- Quality of Service (802.1p) for real-time traffic
- Port rate limiting: 128kbps to 8Mbps
- VLAN (802.1q) with double tagging
- IGMP Snooping for multicast filtering
- Port configuration, status, statistics, mirroring, security
- Loss of link management on fiber ports
- Web-based, Telnet, CLI management interfaces
- SNMP v2 and RMON
- Rich set of diagnostics with logging and alarms

Section 1.2

Ports, Controls and Indicator LEDs

The RS900GP features various ports, controls and indicator LEDs on the front panel for configuring and troubleshooting the device.

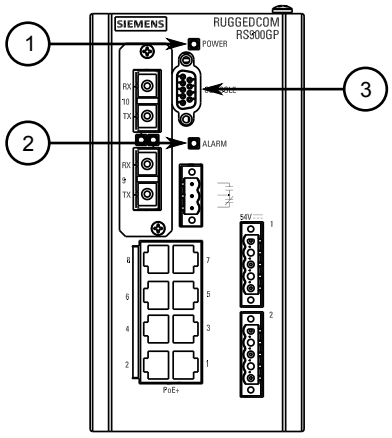

Figure 1: Front Panel

1. Power Indicator LED **2.** Alarm Indicator LED **3.** RS232 Serial Console Port

Power Indicator LED	The power indicator LED illuminates when power is being supplied to the device.
Alarm Indicator LED	The alarm indicator LED illuminates when an alarm condition exists.
RS232 Serial Console Port	This port is for interfacing directly with the device and accessing initial management functions.

2 Installing the Device

The following sections describe how to install the device, including mounting the device, installing/removing modules, connecting power, and connecting the device to the network.

DANGER!
Electrocution hazard – risk of serious personal injury and/or damage to equipment. Before performing any maintenance tasks, make sure all power to the device has been disconnected and wait approximately two minutes for any remaining energy to dissipate.

WARNING!
Burn hazard – risk of serious personal injury. Avoid contact with the surface of the unit. The metal surface may be hot due to the high allowable ambient temperature per specification.

WARNING!
Radiation hazard – risk of serious personal injury. This product contains a laser system and is classified as a CLASS 1 LASER PRODUCT. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

IMPORTANT!
This product contains no user-serviceable parts. Attempted service by unauthorized personnel shall render all warranties null and void.

Changes or modifications not expressly approved by RuggedCom Inc. could invalidate specifications, test results, and agency approvals, and void the user's authority to operate the equipment.

IMPORTANT!
This product should be installed in a restricted access location where access can only be gained by authorized personnel who have been informed of the restrictions and any precautions that must be taken. Access must only be possible through the use of a tool, lock and key, or other means of security, and controlled by the authority responsible for the location.

NOTE
This product contains a Lithium battery that is not replaceable by the operator or by service personnel.

- Section 2.1, “Mounting the Device”
- Section 2.2, “Connecting Low DC Power”
- Section 2.3, “Connecting the Failsafe Alarm Relay”
- Section 2.4, “Connecting to the Device”
- Section 2.5, “Cabling Recommendations”

Section 2.1
Mounting the Device

The RS900GP can be equipped with a DIN rail bracket pre-installed on the back of the chassis. The bracket allows the device to be slid onto a standard 35 mm (1.4 in) DIN rail.

To mount the device to a DIN rail, do the following:

1. Align the slot in the bracket with the DIN rail.

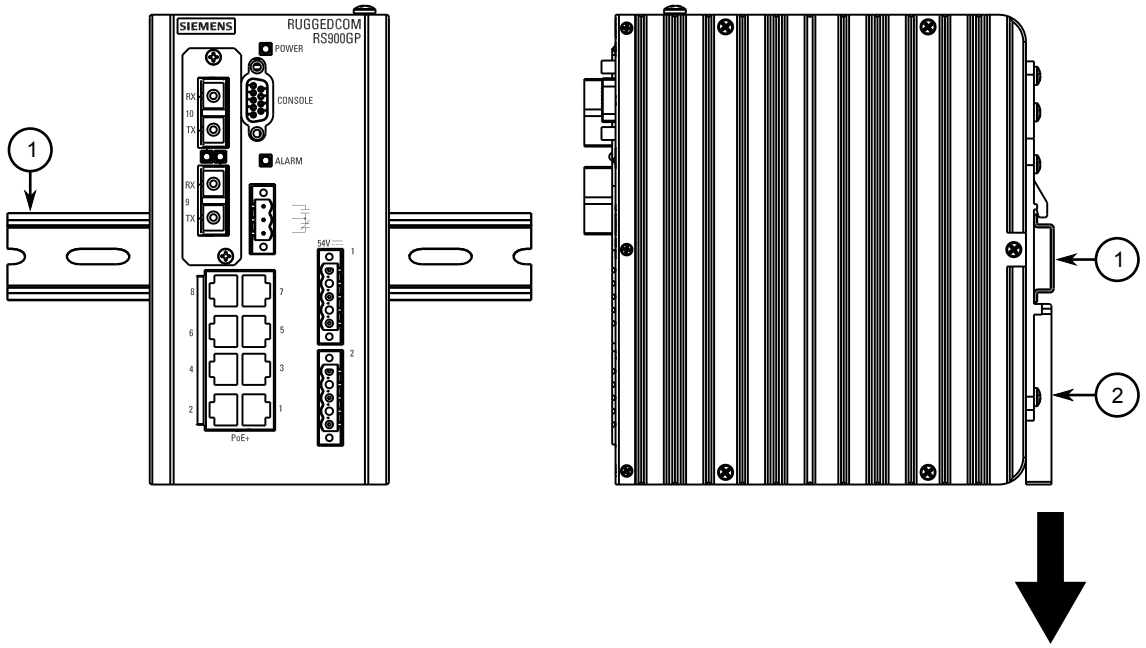

Figure 2: DIN Rail Mounting

1. DIN Rail **2.** DIN Rail Bracket

2. Pull the release on the bracket down and slide the device onto the DIN rail. Let go of the release to lock the device in position.

Section 2.2
Connecting Low DC Power

To connect a low DC power supply to the device, do the following:

1. Connect the positive wire from the power source to the positive terminal on the terminal block.

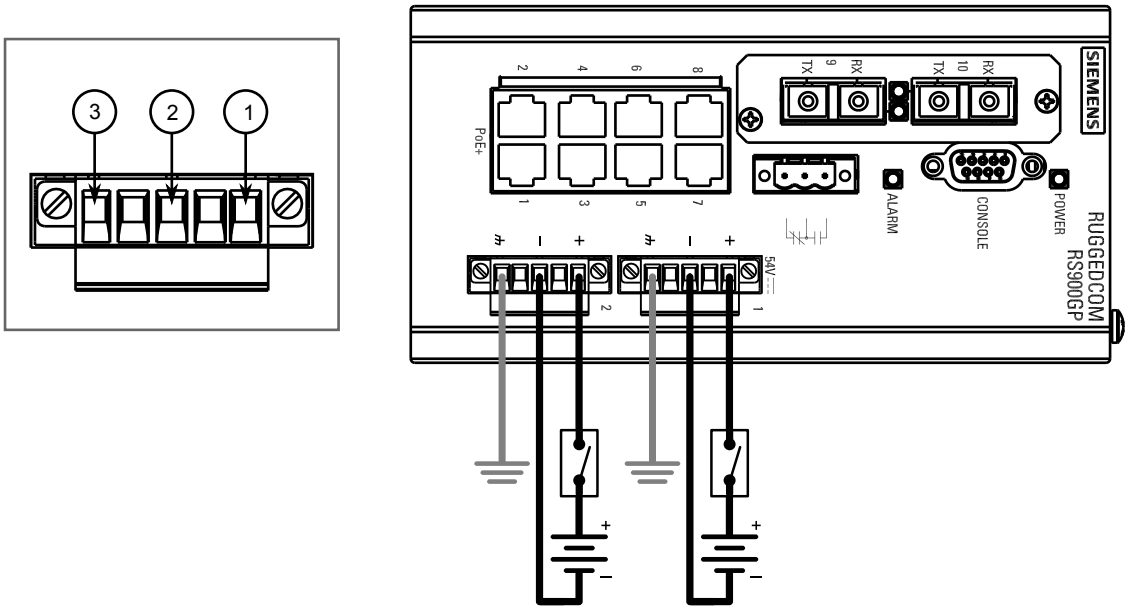

Figure 3: Terminal Block Wiring

1. Positive Terminal **2.** Negative Terminal **3.** Surge Ground Terminal

2. Connect the negative wire from the power source to the negative terminal on the terminal block.
3. Connect the ground terminal on the power source to the chassis ground terminal on the device.

Section 2.3

Connecting the Failsafe Alarm Relay

The failsafe relay can be configured to latch based on alarm conditions. The NO (Normally Open) contact is closed when the unit is powered and there are no active alarms. If the device is not powered or if an active alarm is configured, the relay opens the NO contact and closes the NC (Normally Closed) contact.

NOTE

Control of the failsafe relay output is configurable through ROS . One common application for this relay is to signal an alarm if a power failure occurs. For more information, refer to the ROS User Guide for the RS900GP.

The following shows the proper relay connections.

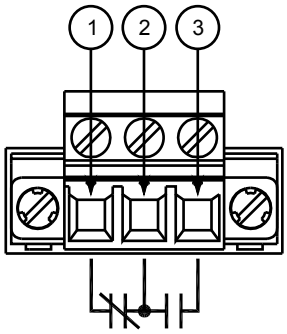

Figure 4: Failsafe Alarm Relay Wiring

1. Normally Open **2.** Common **3.** Normally Closed

Section 2.4

Connecting to the Device

The following describes the various methods for accessing the ROS console and Web interfaces on the device. For more detailed instructions, refer to the *ROS User Guide* for the RS900GP.

Serial Console Port

Connect a PC or terminal directly to the serial console port to access the boot-time control and ROS console interface.

IMPORTANT!
The serial console port is intended to be used only as temporary connections during initial configuration or troubleshooting.

The serial console port implements RS232 DCE (Data Communication Equipment) on a DB9 connector. The following is the pin-out for the port:

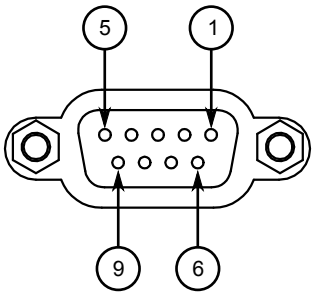

Figure 5: Serial DB9 Console Port

Pin	Name	Description
1	DCD	Data Carrier Detect
2	RX	Receive Data
3	TX	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Signal Ground
6	DSR	Data Set Ready
7	RTS	Request to Send
8	CTS	Clear To Send
9	Reserved (Do Not Connect)	

Communication Ports

Connect any of the available Ethernet ports on the device to a management switch and access the ROS console and Web interfaces via the device's IP address. For more information about available ports, refer to Chapter 3, *Communication Ports*.

Section 2.5

Cabling Recommendations

Siemens does not recommend the use of copper cabling of any length for critical, real-time substation automation applications. All copper Ethernet ports on RUGGEDCOM products include transient suppression circuitry to protect against damage from electrical transients and conform with IEC 61850-3 and IEEE 1613 Class 1 standards. This means that during a transient electrical event, communications errors or interruptions may occur, but recovery is automatic.

Siemens also does not recommend using copper Ethernet ports to interface with devices in the field across distances that could produce high levels of ground potential rise (i.e. greater than 2500 V), during line-to-ground fault conditions.

3 Communication Ports

The RS900GP can be equipped with various types of communication ports to enhance its abilities and performance. To determine which ports are equipped on the device, refer to the factory data file available through ROS . For more information on how to access the factory data file, refer to the *ROS User Guide* for the RS900GP.

Each communication port type has a specific place in the RS900GP chassis.

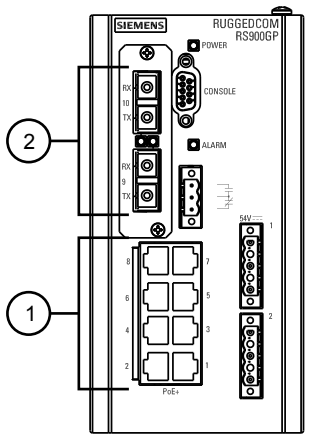

Figure 6: Port Assignment

1. Ports 1 to 8 **2.** Ports 9 to 10

Port	Type
1 to 8	Copper or Fast Ethernet IEEE 802.3af/802.3at Power over Ethernet (PoE) Ports (10/100/1000Base-TX)
9 to 10	Dual Copper Ethernet Ports or Gigabit SFP Transceivers

The following sections describe the available ports:

- Section 3.1, “Copper Ethernet Ports”
- Section 3.2, “Fiber Optic Ethernet Ports”
- Section 3.3, “SFP Optic Ethernet Ports”

Section 3.1

Copper Ethernet Ports

The RS900GP supports several 10/100/1000Base-TX Ethernet ports that allow connection to standard Category 5 (CAT-5) unshielded twisted-pair (UTP) cables with either RJ45 or Micro-D male connectors. The RJ45 and Micro-D connectors are directly connected to the chassis ground on the device and can accept CAT-5 shielded twisted-pair (STP) cables.

In addition, all ports in slots 1 to 8 offer IEEE 802.3af/802.3.at Power over Ethernet (PoE) with nominal 48 VDC at 350 mA (max 15.4W/port), auto-sensing and automatic power off when cables are removed.

WARNING!
Electric shock hazard – risk of serious personal injury and/or equipment interference. If shielded cables are used, make sure the shielded cables do not form a ground loop via the shield wire and the RJ45 receptacles at either end. Ground loops can cause excessive noise and interference, but more importantly, create a potential shock hazard that can result in serious injury.

Each port features an LED that indicates the state of the port.

State	Description
Yellow (Solid)	Link established
Yellow (Blinking)	Link activity
Off	No link detected

The following are the pin-out descriptions for the RJ45 and Micro-D connectors:

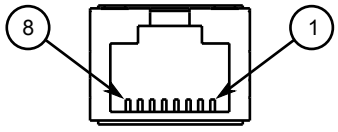

Figure 7: RJ45 Ethernet Port Pin Configuration

Pin	Name		Description
	10/100Base-TX	1000Base-TX	
1	RX+	BI_DB+	Receive Data+ or Bi-Directional
2	RX-	BI_DB-	Receive Data- or Bi-Directional
3	TX+	BI_DA+	Transmit Data+ or Bi-Directional
4	PoE+		
5	PoE+		
6	TX-	BI_DA-	Transmit Data- or Bi-Directional
7	PoE-		
8	PoE-		

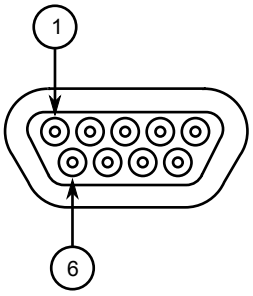

Figure 8: Micro-D 10/100Base-TX Port Pin Configuration

Pin	10/100Base-TX	1000Base-TX
1	TX+	B+
2	Reserved (Do Not Connect)	D+
3	Reserved (Do Not Connect)	
4	PoE+	
5	PoE+	
6	TX-	B-
7	Reserved (Do Not Connect)	D-
8	Reserved (Do Not Connect)	C-

Pin	10/100Base-TX	1000Base-TX
9	RX-	A-

For specifications on the available copper Ethernet ports, refer to Section 4.3, “Copper Ethernet Port Specifications”.

Section 3.2
Fiber Optic Ethernet Ports

Fiber optic Ethernet ports are available with either LC (Lucent Connector) and SC (Standard or Subscriber Connector) connectors. Make sure the Transmit (Tx) and Receive (Rx) connections of each port are properly connected and matched to establish a proper link.

In addition, all ports in slots 1 to 8 offer IEEE 802.3af/802.3.at Power over Ethernet (PoE) with nominal 48 VDC at 350 mA (max 15.4W/port), auto-sensing and automatic power off when cables are removed.

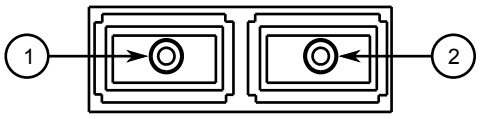

Figure 9: SC Port

1. Tx Connector **2.** Rx Connector

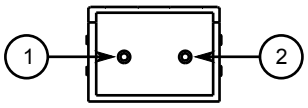

Figure 10: LC Port

1. Tx Connector **2.** Rx Connector

For specifications on the available fiber optic Ethernet ports, refer to Section 4.4, “Fiber Optic Port Specifications”.

Section 3.3
SFP Optic Ethernet Ports

SFP (Small Form-Factor Pluggable) optic Ethernet ports are available with LC (Lucent Connector) connectors. Make sure the Transmit (Tx) and Receive (Rx) connections of each port are properly connected and matched to establish a proper link.

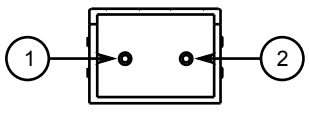

Figure 11: LC Port

1. Tx Connector **2.** Rx Connector

NOTE
SFP modules, as well as their optical ports, can be safely inserted and removed while the chassis is powered and operating.

The following sections describe how to install and remove SFP optical ports:

- Section 3.3.1, “Installing an SFP Optical Port”
- Section 3.3.2, “Removing an SFP Optical Port”

Section 3.3.1
Installing an SFP Optical Port

To install an SFP optical port, do the following:

CAUTION!
Electrical hazard – risk of damage to equipment. Use only components certified by Siemens with RUGGEDCOM products. Damage to the module and device may occur if compatibility and reliability have not been properly assessed.

CAUTION!
Electrical hazard – risk of damage to equipment. Make sure all electrostatic energy is dissipated before installing or removing components from the device. An electrostatic discharge (ESD) can cause serious damage to the component once it is outside the chassis.

1. Make sure all potential electrostatic build-up has been properly discharged to prevent electrostatic discharges (ESD). This can be accomplished by wearing an ESD wrist strap or by touching Earth or the chassis ground.
2. Remove the dust cover from the port opening in the module.

   CAUTION!
   Mechanical hazard – risk of component damage. SFP optical ports are designed to insert in only one orientation. Do not force the port into the module.
3. Remove the port from its packaging.
4. Insert the port into the module and swing the bail-latch up to lock it in place.

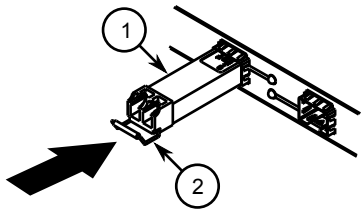

Figure 12: Installing an SFP Optical Port (Typical)

1. SFP Optical Port **2.** Metal Bail-Latch

5. Remove the dust cover from the port.
6. Connect a cable to the port and test the connection.

Section 3.3.2

Removing an SFP Optical Port

To remove an SFP optical port, do the following:

CAUTION!
Electrical hazard – risk of damage to equipment. Make sure all electrostatic energy is dissipated before performing installing or removing components from the device. An electrostatic discharge (ESD) can cause serious damage to the component once it is outside the chassis.

1. Make sure all potential electrostatic build-up has been properly discharged to prevent electrostatic discharges (ESD). This can be accomplished by wearing an ESD wrist strap or by touching Earth or the chassis ground.
2. Disconnect the cable from the port.
3. Swing the metal bail-latch down and pull the port from the module.

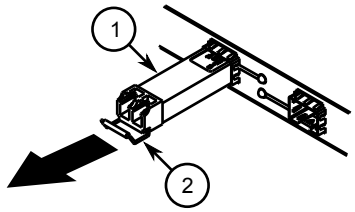

Figure 13: Removing an SFP Optical Port (Typical)

1. SFP Optical Port **2.** Metal Bail-Latch

4. Store the port in an ESD-safe bag or other suitable ESD-safe environment, free from moisture and stored at the proper temperature (-40 to 85 °C or -40 to 185 °F).
5. Insert a plug in the empty port opening to prevent the ingress of dust and dirt.

4 Technical Specifications

The following sections provide important technical specifications related to the device and available modules:

- Section 4.1, “Power Supply Specifications”
- Section 4.2, “Failsafe Relay Specifications”
- Section 4.3, “Copper Ethernet Port Specifications”
- Section 4.4, “Fiber Optic Port Specifications”
- Section 4.5, “Operating Environment”
- Section 4.6, “Mechanical Specifications”

Section 4.1

Power Supply Specifications

General

Power Supply Type	Minimum Input	Maximum Input	Fuse Rating	Isolation	Maximum Power Consumption	Maximum Combined Power Output at PoE Ports
54 VDC	45 VDC	57 VDC	6.3A (T) [a]	1.5 kVDC	15 W	273 W

[a] *(T) denotes time-delay fuse*

IEEE 802.3af

Power In	Power Out
45-57 VDC, 3.5 A Max	44-57 VDC, 15 with Port Max

IEEE 802.3at

Power In	Power Out
51-57 VDC, 6 A Max	50-57 VDC, 30 with Port Max

Section 4.2

Failsafe Relay Specifications

NOTE
The following specifications are for Class-2 circuits only.

Parameter	Value (Resistive Load)
Max Switching Voltage	30 VAC, 80 VDC

Parameter	Value (Resistive Load)
Rated Switching Current	0.3A @ 30 VAC 1A @ 30 VDC, 0.3 A @ 80 VDC

Section 4.3
Copper Ethernet Port Specifications

The following details the specifications for copper Ethernet ports that can be ordered with the RS900GP.

NOTE

- *Maximum segment length is greatly dependent on factors such as fiber quality, and the number of patches and splices. Consult a Siemens sales associate when determining maximum segment distances.*
- *All optical power numbers are listed as dBm averages.*
- *F51 transceivers are rated for -40 to 85 °C (-40 to 185 °F).*

Fixed Gigabit Transceivers

Order Code	Connector	Duplex[b]	Cable Type[c]	Wiring Standard[d]	Maximum Distance[e]	Isolation[f]
CG01	RJ45	FDX/HDX	> Category 5	TIA/EIA T568A/B	100 m (328 ft)	1.5 kV
CG02	micro-D	FDX/HDX	> Category 5	TIA/EIA T568A/B	100 m (328 ft)	1.5 kV

[c] *Shielded or unshielded.*

[d] *Auto-crossover and auto-polarity.*

[e] *Typical distance. Dependent on the number of connectors and splices.*

[f] *RMS 1 minute.*

SFP Gigabit Transceivers

Order Code	Connector	Duplex[g]	Cable Type[h]	Wiring Standard[i]	Maximum Distance	Isolation[j]
CG55	RJ45	FDX/HDX	> Category 5	TIA/EIA T568A/B	100 m (328 ft)	1.5 kV

[h] *Shielded or unshielded.*

[i] *Auto-crossover and auto-polarity.*

[j] *RMS 1 minute.*

Section 4.4
Fiber Optic Port Specifications

The following details the specifications for fiber Ethernet ports that can be ordered with the RS900GP.

NOTE

- *All optical power numbers are listed as dBm averages. To convert from average to peak add 3 dBm. To convert from peak to average, subtract 3 dBm.*
- *Maximum segment length is greatly dependent on factors such as fiber quality, and the number of patches and splices. Consult a Siemens sales associate when determining maximum segment distances.*

NOTE

Order codes are contained within each product when assembled and configured at the factory. Refer to the ROS User Guide for the RS900GP for information on how to obtain the factory configuration data.

- Section 4.4.1, “Fast Ethernet (100 Mbps) Optical Specifications”
- Section 4.4.2, “Gigabit Ethernet (1 Gbps) Optical Specifications”

Section 4.4.1

Fast Ethernet (100 Mbps) Optical Specifications

Order Code	Mode	Connector Type	Cable Type (µm)	Tx λ (typ.) (nm)	Tx min. (dBm)	Tx max. (dBm)	Rx Sensitivity (dBm)	Rx Saturation (dBm)	Distance (typ.) (km)	Power Budget (dB)
FX02	MM	SC	62.5/125	1300	-19	-14	-31	-14	2	12
			50/125		-22.5					8.5
FX05	SM	SC	9/125	1300	-15	-8	-31	-7	20	16
FX07	SM	SC	9/125	1300	-5	0	-34	-3	50	29
FX09	SM	SC	9/125	1300	0	5	-37	0	90	37

Section 4.4.2

Gigabit Ethernet (1 Gbps) Optical Specifications

Fixed Gigabit Transceivers

Order Code	Mode	Connector Type	Cable Type (µm)	Tx λ (typ.) (nm)	Tx min (dBm)	Tx max (dBm)	Rx Sensitivity (dBm)	Rx Saturation (dBm)	Distance (typ.) (km)	Power Budget (dB)
FG01	MM	LC	50/125	850	-9	-2.5	-20	0	0.5	11
FG02	SM	SC	9/125	1310	-10	-3	-20	-3	10	10
FG03	SM	LC	9/125	1310	-9.5	-3	-21	-3	10	11.5
FG04	SM	SC	9/125	1310	-5	0	-20	-3	25	15
FG05	SM	LC	9/125	1310	-7	-3	-24	-3	25	17

SFP Gigabit Transceivers

Order Code	Mode	Connector Type	Cable Type (µm)	Tx λ (typ.) (nm)	Tx min (dBm)	Tx max (dBm)	Rx Sensitivity (dBm)	Rx Saturation (dBm)	Distance (typ.) (km)	Power Budget (dB)
FG51	MM	LC	50/125	850	-9	-2.5	-20	0	0.5	11
			62.5/125						0.3	
FG52	SM	LC	9/125	1310	-9.5	-3	-19	-3	10	9.5
FG53	SM	LC	9/125	1310	-7	-3	-23	-3	25	16
FG54	SM	LC	9/125	1550	0	5	-23	-3	70	23

NOTE

- *Maximum segment length is greatly dependent on factors such as fiber quality, and the number of patches and splices. Consult a Siemens sales associate when determining maximum segment distances.*
- *All optical power numbers are listed as dBm averages.*
- *F51 transceivers are rated for -40 to 85 °C (-40 to 185 °F).*

Section 4.5

Operating Environment

Parameter	Range	Comments
Ambient Operating Temperature	-40 to 85 °C (-40 to 185 °F)	Measured from a 30 cm (12 in) radius surrounding the center of the RS900GP enclosure.
Ambient Relative Humidity	5% to 95%	Non-condensing
Ambient Storage Temperature	-40 to 85 °C (-40 to 185 °F)	
Operating Altitude	0 to 15240 m (0 to 50000 ft)	Over temperature range of -40 to 85 °C (-40 to 185 °F)

Section 4.6

Mechanical Specifications

Parameter	Value
Dimensions	Refer to Chapter 5, *Dimension Drawings*
Weight	2.3 kg (5 lbs)
Ingress Protection	IP40 (1 mm objects)
Enclosure	Cast Aluminum

5 Dimension Drawings

NOTE
All dimensions are in millimeters, unless otherwise stated.

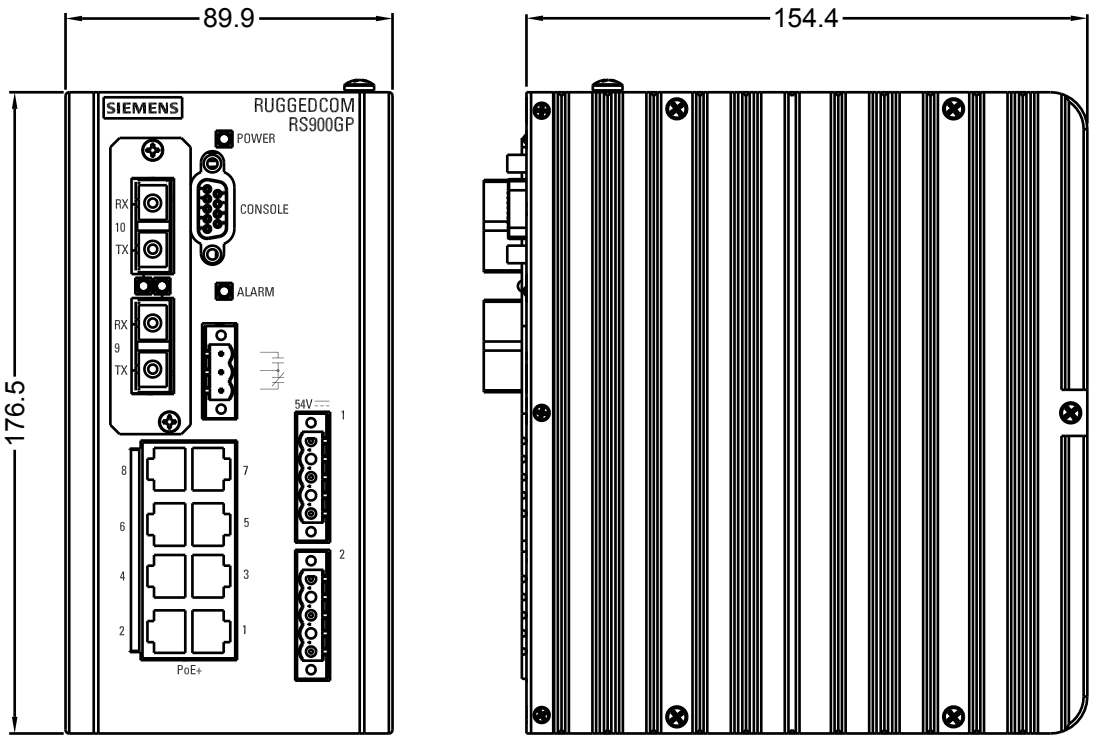

Figure 14: Overall Dimensions

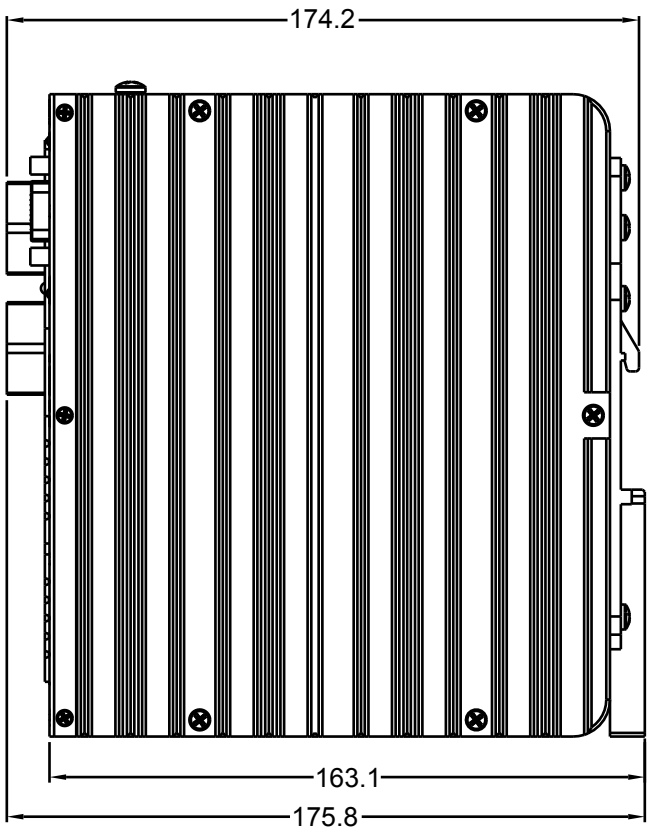

Figure 15: DIN Rail Mount Dimensions

6 Certification

The RS900GP device has been thoroughly tested to guarantee its conformance with recognized standards and has received approval from recognized regulatory agencies.

- Section 6.1, “Agency Approvals”
- Section 6.2, “FCC Compliance”
- Section 6.3, “Industry Canada Compliance”
- Section 6.4, “EMI and Environmental Type Tests”

Section 6.1

Agency Approvals

Agency	Standards	Comments
CSA	CSA C22.2 No. 60950-1, UL 60950-1	Approved
CE	EN 60950-1, EN 61000-6-2, EN 55022 Class A, EN 60825-1, EN 50581	CE Compliance is claimed via Declaration of Self Conformity Route
FCC	FCC Part 15, Class A	Approved
FDA/CDRH	21 CFR Chapter I, Sub-chapter J	Approved

Section 6.2

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference on his own expense.

Section 6.3

Industry Canada Compliance

CAN ICES-3 (A) / NMB-3 (A)

Section 6.4

EMI and Environmental Type Tests

The RS900GP has passed the following EMI and environmental tests.

IEC 61850-3 Type Tests

Test	Description		Test Levels	Severity Levels
IEC 61000-4-2	ESD	Enclosure Contact	+/- 8 kV	4
Enclosure Air	+/- 15 kV	4		
IEC 61000-4-3	Radiated RFI	Enclosure ports	20 V/m	x
IEC 61000-4-4	Burst (Fast Transient)	Signal ports	+/- 4 kV @ 2.5 kHz	x
		DC Power ports	+/- 1.5 kV	x
		Earth ground ports	+/- 4 kV	4
IEC 61000-4-5	Surge	Signal ports	+/- 2 kV line-to-earth, +/- 1.5 kV line-to-line	4
		DC Power ports	+/- 500 V line-to-earth, 500 V line-to-line	1
IEC 61000-4-6	Induced (Conducted) RFI	Signal ports	10 V	3
		D.C Power ports	10 V	3
		Earth ground ports	10 V	3
IEC 61000-4-8	Magnetic Field	Enclosure ports	40 A/m continuous, 1000 A/m for 1 s	
IEC 61000-4-29	Voltage Dips and Interrupts	DC Power ports	30% for 0.1 s, 60% for 0.1 s, 100% for 0.05 s	
IEC 61000-4-12	Damped Oscillatory	Signal ports	2.5 kV common, 1 kV differential mode @ 1 MHz	3
		DC Power ports	2.5 kV common, 1 kV differential mode @ 1 MHz	3
IEC 61000-4-16	Mains Frequency Voltage	Signal ports	30 V Continuous, 300 V for 1s	4
		DC Power ports	30 V Continuous, 300 V for 1s	4
IEC 61000-4-17	Ripple on DC Power Supply	DC Power ports	10%	3
IEC 60255-5	Dielectric Strength	Signal ports	1.5 kVAC (Fail-Safe Relay output)	
		DC Power ports	1.5 kVDC	
IEC 60255-5	H. V. Impulse	Signal ports	5 kV (Fail-Safe Relay output)	
		DC Power ports	5 kV	

IEEE 1613 (C37.90.x) EMI Immunity Type Tests

NOTE
The RS900GP meets Class 2 requirements for an all-fiber configuration and Class 1 requirements for copper ports.

IEEE Test	IEEE 1613 Clause	Description		Test Levels
C37.90.3	9	ESD	Enclosure Contact	+/- 8 kV
Enclosure Air	+/- 12 kV			
C37.90.2	8	Radiated RFI	Enclosure ports	35 V/m
C37.90.1	7	Fast Transient	Signal ports	+/- 2 kV @ 2.5 kHz
			DC Power ports	+/- 1.5 kV
			Earth ground ports	+/- 2 kV
C37.90.1	7	Oscillatory	Signal ports	2.2 kV common mode @ 1 MHz
			DC Power ports	2.2 kV common and differential mode @ 1 MHz
C37.90	6	H. V. Impulse	Signal ports	5 kV (Failsafe Relay)
			DC Power ports	5 kV
C37.90	6	Dielectric Strength	Signal ports	2 kVAC (Failsafe Relay)
			DC Power ports	1.5 kVDC

Environmental Type Tests

Test	Description		Test Levels	Severity Levels
IEC 60068-2-1	Cold Temperature	Test Ad	-40 °C (-40 °F), 16 Hours	
IEC 60068-2-2	Dry Heat	Test Bd	85 °C (185 °F), 16 Hours	
IEC 60068-2-30	Humidity (Damp Heat, Cyclic)	Test Db	95% (non-condensing), 55 °C (131 °F), 6 cycles	
IEC 60255-21-1	Vibration		2g @ 10-150 Hz	Class 2
IEC 60255-21-2	Shock		30g @ 11 ms	Class 2